flow of liquid through the liquid channel **415**. Each of the heat exchange channels **470** and **475** may be used to form a single or multiple temperature zones along the length of the heat exchange channels **470** and **475**. For example, a separate heat exchange zone may be employed for each of the microchannel distillation sections (**410**, **410***a*). That is, each of the microchannel distillation sections (**410**, **410***a*) may be operated at a different temperature.

[**0065**] The distillation process **100**B illustrated in **FIG. 8** is the same as the distillation process **100** illustrated in **FIG. 1** except that more detail is provided in **FIG. 8**. In **FIG. 8** distillation column or apparatus **100**B is disclosed and the microchannel distillation unit **300**A illustrated in **FIG. 5** is specifically shown as being used in distillation column or apparatus **110**B. Distillation column or apparatus **110**B includes microchannel condenser **120**B and microchannel reboiler **130**B. The microchannel distillation unit **300**A illustrated in **FIG. 8** contains n microchannel distillation sections **370**, that is, microchannel distillation sections **370**, **370***a*, **370***b*. . . **370***n*-**2**, **370**-*n*-**1** and **370***n*, wherein n is a number that can be of any value, for example, 5, 10, 20, 50, 100, 500, 1000, 10000, etc. The broken space in **FIG. 8** indicates that distillation sections **370** beyond those illustrated may be provided. The microchannel distillation unit **300**A employed in distillation column or apparatus **110**B has the same construction and functions in the same manner as the microchannel distillation unit **300**A illustrated in **FIG. 5**. A feed comprising a fluid mixture comprising components X and Y enters distillation column or apparatus **110**B. Within the distillation column or apparatus **110**B a vapor phase flows through a series of microchannel distillation sections **370** in a direction towards the microchannel condenser **120**B and a liquid phase flows through a series of microchannel distillation sections **370** in a direction towards the microchannel reboiler **130**B. In each microchannel distillation section **370** the vapor phase and the liquid phase contact each other with the result being a mass transfer between the phases. In each microchannel distillation section **370** part of the more volatile component Y transfers from the liquid phase to the vapor phase, and part of the less volatile component X transfers from the vapor phase to the liquid phase. The vapor phase, which is progressively enriched with the more volatile component Y, flows through microchannel distillation sections **370** towards the microchannel condenser **120**B and into the microchannel condenser **120**B. The liquid phase, which is progressively enriched with the less volatile component X, flows through the microchannel distillation sections **370** towards the microchannel reboiler **130**B and into the microchannel reboiler **130**B. The microchannel condenser **120**B illustrated in **FIG. 8** comprises portions of process microchannel **310** and liquid channel **330**, the latter including a portion of wicking region **332**. The microchannel condenser **120**B also comprises microchannel condenser space **121**, interior wall **123**, distillate outlets **124** and **125**, and heat exchange channels **126** and **127**. The microchannel condenser space **121** may have the same dimensions of height and width as the process microchannel **310**. The heat exchange channels **126** and **127** may have the same dimensions as the heat exchange channels **350** and **360**. In operation, the vapor phase from microchannel distillation section **370***n* flows through capture structure **372***n*, as indicated by arrow **314***n*, into microchannel condenser space **121** wherein the vapor phase is condensed. Part or all of the condensed vapor phase, which may be referred to as distillate product D, flows from microchannel condenser **120**B through distillate outlet **125**, as indicated by arrow **122**. Part or all of the distillate product D may flow through distillate outlet **124** into wicking region **332**, and through wicking region **332** to liquid entrance **376***n*, as indicated by arrow **333***n*. From that point, the liquid phase flows through the liquid channel **330** and the series of microchannel sections **370***n* to **370** towards the microchannel reboiler **130**B.

[**0066**] The microchannel reboiler **130**B illustrated in **FIG. 8** comprises portions of process microchannel **310** and liquid channel **330**, the latter including a portion of wicking region **332**. The microchannel reboiler **130**B also includes microchannel reboiler space **131**, liquid inlet **133**, vapor outlet **134**, liquid outlet **135**, and heat exchange channels **136** and **137**. The microchannel reboiler space **131** may have the same dimensions of height and width as the process microchannel **310**. The reboiler heat exchange channels **136** and **137** may have the same dimensions as the heat exchange channels **350** and **360**. In operation, the liquid phase from microchannel distillation section **370** flows through liquid inlet **133**, as indicated by arrow **336**, into microchannel reboiler space **131** wherein part or all of the liquid phase may be vaporized and the remainder remains in liquid form. The part that remains in liquid form, which may be referred to as bottoms product B, flows out of microchannel reboiler **130**B through liquid outlet **135**, as indicated by arrow **132**. The part of the liquid product that is vaporized flows through vapor outlet **134**, as indicated by arrow **311**, into microdistillation section **370**. From that point, the vapor phase flows through the process microchannel **310** and the series of microchannel sections **370** to **370***n* towards the microchannel condenser **120**B.

[**0067**] Although only one microchannel distillation unit (**300**, **300**A, **300**B, **400**) is illustrated in **FIGS. 4-8**, there is practically no upper limit to the number of microchannel distillation units into and out of **FIGS. 4-8** and from left to right in the figures that may be used in a distillation column or apparatus for conducting the inventive process. For example, one, two, three, four, five, six, eight, ten, twenty, fifty, one hundred, hundreds, one thousand, thousands, ten thousand, tens of thousands, one hundred thousand, hundreds of thousands, millions, etc., of the microchannel distillation units described above may be used. The process microchannels, and associated liquid channels and heat exchange channels may be aligned side-by-side or stacked one above another. In embodiments where more than one microchannel distillation unit is present, the feed must be distributed among the microchannel distillation units and introduced into each microchannel distillation unit at a location that is intermediate between the microchannel reboiler and condenser. This can be accomplished through the addition of feed channels to carry the distributed feed fluids to each microchannel distillation unit or by partitioning off unused portions of existing microchannel distillation units (such as heat exchange channels) which are not used in the region of the microchannel distillation unit where feed is to be distributed and introduced. Those skilled in the art can determine desirable locations along the length of the microchannel distillation unit at which the feed might be introduced. The feed distribution might be accomplished through the aid of a wick distribution structure if a liquid, or through other means, such as distribution through an array of orifices.